

Claims

1. An LCD system capable of fast mode operation with high contrast, said system comprising:

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a) a source of polarized lights;

b) an LC cell having a surface upon which said light is incident; and

c) contrast enhancement means for reducing or rendering harmless reflections of said light at said surface tending to degrade contrast.

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2. The system of claim 1 wherein said cell includes LC bulk material contained between and adjoining an upper and a lower glass substrate, said upper substrate having said surface.

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3. The system of claim 2 wherein said contrast enhancement means comprise an optically anisotropic intermediate layer interposed between said upper substrate and said LC material.

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4. The system of claim 3 wherein said intermediate optically anisotropic layer is an LC polymer having a predetermined director profile.

5. The system of claim 3 wherein said optically anisotropic intermediate layer comprises a photo polymer.

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6. The system of claim 3 wherein said optically anisotropic intermediate layer is evaporated obliquely between said upper and lower glass substrates.

7. The system of claim 3 wherein said optically anisotropic intermediate layer is etched by an oblique particle beam.

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8. The system of claim 3 wherein said optically anisotropic intermediate layer is milled.

9. The system of claim 1 wherein said contrast enhancement means comprise said LC bulk material having a pretilt of between about 45° and 90° on the side adjoining said upper substrate and a pretilt of less than 10° on the side adjoining said lower substrate.

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15 10. An LC light valve capable of operation with high contrast in fast operating modes, including ECB, said valve comprising:

20 a) upper and lower glass substrates having opposed surfaces in spaced, parallel planes; and
b) a layer of hybrid aligned LC material interposed between and adjoining each of said substrates, said LC material having a pretilt of between about 45° and 90° on the side adjoining said upper substrate, and a pretilt of less than 10° on the side adjoining said lower substrate.

25 11. An LC light valve capable of operation with high contrast in fast operating modes, including ECB, said light valve comprising:

a) upper and lower glass substrates having opposed surfaces in spaced, parallel planes;

b) a layer of LC material interposed between said opposing surfaces and adjoining said lower substrate; and

5 c) an intermediate layer of LC polymer material interposed between and adjoining each of said upper substrate and said LC material, said LC polymer material having a particular director profile.

10 12. The light valve of claim 11 wherein a boundary layer of said LC material is formed at the junction of said LC polymer and said LC material when said valve is subjected to a strong bias and reflections of incident light are reduced due to gradual transition of refractive index from said upper substrate to said boundary layer to said LC material adjoining said boundary layer.

15 13. The light valve of claim 11 wherein the pretilt throughout said intermediate layer deviates by less than 10° from the direction parallel to said opposing surfaces.